CLAIMS:

We claim:

1. A piston head assembly for reciprocating in a cylinder, the cylinder having an inside surface, the inside surface having an inside diameter, the piston head assembly comprising:

a piston hub comprising:

an annular flange having an outer surface; and

an annular resilient piston seal mounted on the piston hub, the annular resilient piston seal comprising:

an annular heel section of a first resilient material having a first hardness, the annular flange concentrically embedded into a posterior portion of the annular heel section, an outer portion of the posterior portion of the annular heel section surrounding a portion of the outer surface of the annular flange.

2. The piston head assembly of claim 1, wherein the annular resilient piston seal is bonded to the piston hub.

3. The piston head assembly of claim 1, wherein the annular heel section surrounds the entire outer surface of the annular flange.

4. The piston head assembly of claim 3, the annular flange comprising:

an annular lip on a posterior surface of the annular flange, the heel section overlapping the annular lip.

5. The piston head assembly of claim 1, the annular resilient piston seal further comprising:

a lip section of a second resilient material, the second resilient material having a second hardness with the second hardness being less than the first hardness, the lip section concentrically connected to the annular heel section, the lip section comprising:

an annular projection formed in an outer surface of the lip section, the annular projection having a maximum outer diameter in an interior portion of the annular projection greater than the inside diameter of the inner surface of the cylinder, the annular projection compressible upon insertion of the piston head assembly into the cylinder, forming a seal.

6. The piston head assembly of claim 5, the annular projection formed by machining the second resilient material.

7. The piston head assembly of claim 5, the annular projection formed by molding the second resilient material.

8. The piston head assembly of claim 5, wherein the annular projection has a generally triangular cross section.

9. The piston head assembly of claim 5, wherein the second resilient material is a polyurethane.

10. The piston head assembly of claim 1, wherein the first resilient material is a polyurethane.

11. A resilient annular piston seal for mounting on a piston head for reciprocating in a cylinder, the cylinder having an inside surface, the inside surface having an inside diameter, the resilient annular piston seal comprising:

an annular flange having an outer surface;

an annular heel section of a first resilient material having a first hardness, the annular flange concentrically embedded into a posterior portion of the annular heel section, an outer portion of the posterior portion of the annular heel section surrounding a portion of the outer surface of the annular flange.

12. The piston seal of claim 11, wherein the piston seal is bonded to the annular flange.

13. The piston seal of claim 11, wherein the annular heel section surrounds the entire outer surface of the annular flange.

14. The piston seal of claim 13, the annular flange comprising:

an annular lip on a posterior surface of the annular flange, the annular heel section overlapping the annular lip.

15. The piston seal of claim 11, the annular resilient piston seal further comprising:

a lip section of a second resilient material, the second resilient material having a second hardness with the second hardness being less than the first hardness, the lip section concentrically connected to the annular heel section, the lip section comprising:

an annular projection formed in an outer surface of the lip section, the annular projection having a maximum outer diameter in an interior portion of the annular projection greater than the inside diameter of the inner surface of the cylinder, the annular projection compressible upon insertion of the piston head assembly into the cylinder, forming a seal.

16. The piston seal of claim 15, the annular projection formed by machining the second resilient material.

17. The piston seal of claim 15, the annular projection formed by molding the second resilient material.

18. The piston seal of claim 15, wherein the annular projection has a generally triangular cross section.

19. The piston seal of claim 15, wherein the second resilient material is a polyurethane.

20. The piston seal of claim 11, wherein the first resilient material is a polyurethane.

21. A method of sealing a piston head for reciprocating in a cylinder, the cylinder having an inside surface, the inside surface having an inside diameter, the method comprising the steps of:

forming an annular heel section from a first resilient material having a first hardness;

concentrically embedding an annular flange in a posterior portion of the annular heel section, covering a portion of the outer surface of the annular flange with the first resilient material;

attaching the annular heel section to the annular flange, forming a piston head; and

inserting the piston head into the cylinder.

22. The method of claim 21, the step of attaching the annular heel section to the annular flange comprising the step of:

bonding the annular heel section to the annular flange.

23. The method of claim 21, the step of concentrically embedding an annular flange in a posterior portion of the annular heel section comprising the step of:

covering the entire outer surface of the annular flange with the annular heel section.

24. The method of claim 23, further comprising the step of:

concentrically forming an annular lip in a posterior surface of the annular flange; and

the step of embedding the annular flange comprising the step of:

wrapping the annular heel section around the outer surface of the annular flange onto the annular lip of the annular flange.

25. The method of claim 21, further comprising the step of:

concentrically forming an annular lip section from a second resilient material having a second hardness onto an anterior surface of the annular heel section, with the second hardness being less than the first hardness, the annular lip section having a

maximum outer diameter in an interior portion of the annular lip section larger than the inside diameter of the inside surface; and

the step of inserting the piston head into the cylinder comprising the step of:

radially compressing the annular lip section to form a seal.

26. The method of claim 24, the step of concentrically forming an annular lip section comprising the step of:

forming an annular projection on an outer surface of the lip section, the annular projection having a maximum outer diameter in an interior portion of the annular projection equal to the maximum outer diameter of the lip section.

27. The method of claim 25, wherein the second resilient material is a polyurethane.

28. The method of claim 24, wherein the first resilient material is a polyurethane.

29. A method of improving the life of a reciprocating piston seal in a cylinder, the cylinder having an inside surface, the inside surface having an inside diameter, the method comprising the steps of:

forming a resilient annular piston seal from a resilient material onto an annular piston hub having an anterior surface, a posterior surface, and an outer surface, the resilient annular piston seal formed onto the anterior surface of the piston hub, the resilient annular piston seal generally having an outer diameter less than the inside diameter of the cylinder; and

forming the resilient material around a portion of the outer surface of the piston hub, covering the portion of the outer surface of the piston hub.

30. The method of claim 29, the step of forming the resilient material around the portion of the outer surface of the piston hub comprising the step of:

bonding the resilient annular piston seal to the piston hub.

31. The method of claim 29, the step of forming the resilient material around the portion of the outer surface of the piston hub comprising the steps of:

forming a annular lip in the posterior surface of the piston hub; and

wrapping the resilient material over the annular lip.

32. The method of claim 29, the step of forming a resilient annular piston seal comprising the steps of:

forming a heel portion of a first resilient material having a first hardness.

33. The method of claim 32, the step of forming a resilient annular piston seal further comprising the step of:

concentrically forming a lip portion of a second resilient material having a second hardness onto the heel portion distal from the piston hub, with the second hardness being less than the first hardness; and

forming a concentric annular projection in the lip portion having a maximum outer diameter in an interior portion of the concentric annular projection greater than the inside diameter of the cylinder.

34. The method of claim 33, wherein the concentric annular projection has a generally triangular cross-section.

35. A piston head assembly for reciprocating in a cylinder, the cylinder having an inside surface, the inside surface having an inside diameter, the piston head assembly comprising:

a piston hub comprising:

an annular flange having a first surface, a second surface, and an outer surface connecting the first surface and the second surface; and

a first annular resilient piston seal mounted on the first surface of the piston hub, the first annular resilient piston seal comprising:

a first annular heel section of a first resilient material having a first hardness;

a second annular resilient piston seal mounted on the second surface of the piston hub, the second annular resilient piston comprising:

a second annular heel section of the first resilient material; and

an annular middle section of the first resilient material connecting the first annular resilient piston seal and the second annular resilient piston seal, the annular middle section covering the outer surface of the annular flange.

36. A piston head assembly for reciprocating in a cylinder, the cylinder having an inside surface, the inside surface having an inside diameter, the piston head assembly comprising:

a piston hub comprising:

an annular flange having an anterior surface, an outer surface and a posterior surface; and

an annular resilient piston seal mounted on the piston hub, the annular resilient piston seal comprising:

an annular heel section of a first resilient material having a first hardness mounted on the anterior surface of the annular flange; and

an annular bumper section of the first resilient material covering the outer surface of the annular flange at an intersection between the outer surface and the posterior surface.

37. The piston head assembly of claim 36, the annular resilient piston seal further comprising:

a lip section of a second resilient material, the second resilient material having a second hardness with the second hardness being less than the first hardness, the lip section concentrically connected to the annular heel section, the lip section comprising:

an annular projection formed in an outer surface of the lip section, the annular projection having a maximum outer diameter in an interior portion of the annular projection greater than the inside diameter of the inner surface of the cylinder, the annular projection compressible upon insertion of the piston head assembly into the cylinder, forming a seal.

38. The piston head assembly of claim 37, wherein the annular projection has a generally triangular cross section.

39. The piston head assembly of claim 37, wherein the second resilient material is a polyurethane.

40. The piston head assembly of claim 35, wherein the first resilient material is a polyurethane.